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SCIENCE

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THE MARINE BIOLOGICAL LABORATORY.

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THE sixth summer session of the Marine Biological Laboratory, at Wood's Holl, Mass., ended with August '93, and a short review of the station, of its work and growth, will be of interest to *Science* readers, throughout the country, who are at all interested in our advancement in biological thought and investigation.

The phenomenal growth and splendid proportions of the Marine Biological Laboratory, as it now stands, justly deserve the interest and admiration of every educated American.

Starting six years ago, in 1888, the Laboratory was but a single building of two large rooms, poorly equipped for work, with only one boat for collecting material, and a total of seventeen students. The session of '93 opened with three connected buildings more than twice as large as the original, containing thirty-four private rooms, a lecture room, a library, a supply department, five general laboratories, and a total of one hundred and twelve students. Instead of a single row-boat, there are now several at the Laboratory's wharf and beside these a splendid Burgess-built steam launch perfectly equipped for collecting and always at the students' command.

The secret of this extraordinary growth is mainly due to the Laboratory's ideal foundation, its location, its officers and the high grade of its work.

In 1881, at Annisquam, a quaint little fishing village on Cape Ann, the Woman's Educational Society of Boston started a small laboratory for the study of marine zoology. For six years investigation was carried on here, with constantly increasing demands for *better and more accommodations*, until the necessity of a permanent and better equipped laboratory brought together a number of Boston scientists, who were organized into a corporation under the name of the Marine Biological Laboratory.

Thus it came into existence, and though started in Boston it is by no means a local institution. It can hardly be called national, for students from Maine to California work side by side with those from England, Germany and Japan. Its board of trustees includes a large proportion of America's most prominent scientists, and their aim is to make the Laboratory an institution second to none of its kind in the world.

The location of the Laboratory at Wood's Holl is most happy. It was not the result of luck or chance. Over twenty years ago the late Professor Spencer F. Baird, of the Smithsonian Institution, recognized the advantages of Wood's Holl for the study of marine life, and for many years he and his assistants came here and worked through the summer months. As a result of his work, the United States has established here her most important fishing station, whose buildings are the finest of their kind in the world. Nowhere along the Atlantic coast do the American waters offer more varied or richer fields for the naturalist.

Looking off to the southward from a Laboratory window, Martha's Vineyard is seen stretching away in the distance till its point is lost behind Nonameset, which in turn is followed by Naushon, by Nashuena, by Cuttyhunk and others. Behind to the west lies Buzzard's Bay with its distant shore and the little Weepecket Islands like dots upon its surface. In front again is Vineyard Sound, the Harbor, Wood's Hole, Quick's Hole, and other holes innumerable, all teeming with life and all within easy reach of the student.

What a happy hunting ground! What variety of forms! What wealth of numbers! What a paradise for the naturalist! The sandy shores, the rocky points, the muddy bays, the tide-pools, holes and bottoms from the depths in Vineyard Sound to the shallows of Buzzard's Bay, are all astir with life which the student may study at first hand.

After a year's study at the Laboratory the average student wakes up to the fact that he never knew before what the study of zoology or botany meant.

He is no longer looking at "stuffed things" wired fast to sticks, or withered, shrunken, faded stuff in glass bottles.

The specimens are not stuffed with tow nor wired to the rocks, which he gathers from the shores at Wood's Holl, nor do they float around in alcohol. He learns many new names, but does not spend the summer committing to memory the check-list of species on the coast. He returns to his teaching or college with a larger idea of life; to his reading and work asking how and why and when. He returns to every thing with renewed vigor and enthusiasm, except to the college museum.

The work done at the Laboratory is divided into two very distinct divisions. The institution is at once a centre for the advancement and for the diffusion of knowledge; it is a school for teaching and a station for research; and accordingly the students who annually attend are divided by a distinct line into pupils and investigators. In the first category come those who have had but an elementary course in zoology, who are practically unacquainted with the methods of work, who must needs have a broad and general knowledge of the structure of the various groups of animals, must become acquainted with the great principles of biology, and the use of the naturalist's instruments, before they can engage in original research.

For the needs of this class of students the Marine Biological Laboratory is eminently fitted. In no other institution of its kind has this department been so carefully and thoroughly developed. The Marine Biological Laboratory is unique in this. It stands alone. It is an entirely new departure, and the student who intends to teach or work in any line of biological investigation has an advantage here that is entirely without equal.

Each student has his regular table, his locker for instruments, his own reagents and complete outfit for work. In the centre of the room are the aquaria where his living material is kept. Here he may work, as long as he likes, with abundant material, free to ask questions, and with some eminent biologist always at hand in case of difficulty.

The instruction is largely personal. From 9 till 10 A. M. there is a general lecture, bearing on the form that is to be studied that day. This lecture is always given by some specialist in that particular group. To-day, for instance, the form under study will be a sponge; the morning lecture then will be by some investigator who is making sponges his special study. After this lecture the day is given up to study, and the instructors are always near, with criticism and suggestion, clearing away the difficulties as they arise, until the student, working form after form, gradually masters the technique and learns in part to interpret facts for himself.

After this course, if he chooses to return another year and pursue the work further, he takes a table in the upper laboratory, where he is given some problem to solve, which is not too difficult, and here again he is helped over the hard places, until, having had sufficient preliminary training, he is capable of choosing and solving his own problems.

For those who carry on special investigations private rooms are provided, where they may work undisturbed and in perfect quiet.

This year there are thirty-four of these rooms, each occupied by some investigator, working at some problem whose solution will have an important bearing on the scientific thought of the day.

This summer gathering of our biologists and scientists at the Marine Biological Laboratory, apart from the natural advantages of the place, is of the greatest help and importance. There is an enthusiasm and stimulus in the numbers and personal contact which nothing else gives. Men of different schools, working in widely separated fields, here meet and compare ideas and methods. Their lines of work continually cross and the help of a specialist's suggestions at these points cannot be overestimated. Hardly a paper goes to press, but that it has first received the honest judgment and criticism of those whom the author most wishes to reach.

Every point of interest and doubt is carefully weighed and discussed, and very seldom does error escape detection. As often happened this year, papers which have been long in preparation, and discoveries that are entirely new, are delivered as lectures before the whole student body, and are afterward discussed, allowing every one the privilege of expressing his criticism and opinion. This is not only of immense value to the author, but all present are thus kept in the very van of scientific thought.

The student who wishes to come to Wood's Holl does not necessarily need to be working some problem of marine life, to enjoy the advantages of the Laboratory. His work may be such that requires the fresh-water ponds, or the woods and fields, it may be; if so, they are all at hand. The character of the surrounding land is almost as varied as that of the water. The green and rolling hills, the winding road-ways, the quiet, shady ponds,—all combine to make the country round about Wood's Holl a land of delight to the summer visitor, whether he be student or pleasure seeker.

One of the newest features of the Marine Biological Laboratory is the Department of Physiology. This was first opened last year under Dr. Jacques Loeb, of the University of Chicago. This year professors from Harvard Medical School, the College of Physicians and Surgeons, from Johns Hopkins and other such schools have occupied the rooms and have placed the department on a sure and successful footing.

The Botanical Department gave a course in Cryptogamic Botany in reference to marine algæ and a parallel course in comparative forms of Fungi. The department was crowded, several specialists investigating problems connected with marine plant-life.

The "Supply Department" of the Laboratory, while it is a side issue and of no special concern to the summer student, is nevertheless an institution of great interest and importance to every zoological teacher in the country. The collecting is under the care of Mr. F. W. Wamsley, who has had much experience in the work, and he has reduced the business of collecting, killing and preserving, to a science.

Full data accompany every specimen. The date, even the hour in some cases, the location, depth of water, character of bottom, and many other minor details, are carefully noted. Then the killing fluid is tested and proportioned, and so on through every step in the process of fixing the tissues, which is often very complicated, until the specimen is finally preserved in the proper alcohol. As the value of a zoological specimen preserved for class use, or for histological purposes, depends entirely upon the methods used in its preservation, it should be, and is, a source of great satisfaction to know that the Marine Biological Laboratory has established a department where such material can be supplied, which formerly could not well be had short of Naples.

The excellent library of the Laboratory is at all times open to the student. The Laboratory is a regular subscriber to about thirty of the leading biological and other scientific papers of our own and foreign countries. Besides this, the Boston Society of Natural History has generously placed the use of their library at the disposal of the Laboratory, and the library at the Laboratory has been in this way effectively supplemented.

The evening lecture course for the session of '93 was like that of former years, dealing mainly with subjects of general interest. Night after night the little lecture room was crowded with the students and their friends and the people from the village.

Such, in brief outline, is the Marine Biological Laboratory at the close of its sixth year.

We are justly proud of what it has been and now is. Its short history is one of severest struggle. What it now is, is owing to the generosity and earnest labor of a few; what it is to be, depends, in part, on your generosity and mine. What it *may* be, is summed up in these few words from the last report of its director, Dr. C. O. Whitman, "We have now seen about the limit of what can be accomplished without funds. The two functions of instruction and investigation have worked admirably together, each growing stronger in the success of the other. We have endeavored to keep the two properly balanced, but I think we have nearly reached the limit of our capacity for instruction with our present space and means. We already see that to tax our teaching forces much more, would not tend to improve the side of investigation. For further development, then, two things have to be provided, namely, *room and funds*. As we cannot well enlarge our building, and as the conditions for both branches of our work could be immensely improved by providing a separate building for the investigators, our next step is clearly defined: It is a suitable observatory for the exclusive use of those engaged in original research. Preparatory to this, a site is to be selected and secured. This done, the plan of the building worked out, the equipment estimated, the income necessary to the maintenance of the observatory, with its officers and scientific staff ascertained, we shall be prepared to lay the whole matter before any one who may be disposed to contribute to the foundation of a biological observatory—an observatory which shall be an honor to America, and worthy of that promising science of the future to which the world looks for grander discoveries than have yet enriched human knowledge or contributed to the welfare and advancement of the race."